<div align="center">

REMARKS

</div>

Claims 1-4, 101, and 150-157 are currently pending in the subject application and are presently under consideration. Claims 1, 101, and 157 have been amended as shown on pp. 2-28 of the Reply. Favorable reconsideration of the subject patent application is respectfully requested in view of the comments and amendments herein.

I.   Rejection of Claims 101 and 152-156 Under 35 U.S.C. §101

Claims 101 and 152-156 stand rejected under 35 U.S.C. §101 because the claimed innovation is directed to non-statutory subject matter. Claim 101 has been amended to recite <u>at least one instruction is executed on a processor operatively coupled to memory in relation to the receiving, selecting, scoring, smoothing, employing, or a combination thereof</u>. In view of the above, it is readily apparent that the subject innovation as recited in independent claim 101 (and associated dependent claims 152-156) is directed to statutory subject matter pursuant to 35 U.S.C. §101. Accordingly, this rejection should be withdrawn.

II. Rejection of Claims 101, 153, 155, and 156 Under 35 U.S.C. §103(a)

Claims 101, 153, 155, and 156 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Linden *et al.* (US 6,216,649) in view of Karypis *et al.* ("Evaluation of Item-based Top-N Recommendation Algorithms" 2001). It is respectfully submitted that this rejection should be withdrawn for at least the following reasons. Linden *et al.*, either alone or in combination with Karypis *et al.*, does not teach or suggest each and every limitation of the subject claims.

> To reject claims in an application under § 103, an examiner must establish a *prima facie* case of obviousness. A *prima facie* case of obviousness is established by a showing of three basic criteria. First, there must be some apparent reason to combine the known elements in the fashion claimed by the patent at issue (e.g., in the references themselves, interrelated teachings of multiple patents, the effects of demands known to the design community or present in the marketplace, or in the knowledge generally available to one of ordinary skill in the art). To facilitate review, this analysis should be made explicit. Second, there must be a reasonable expectation of success. *Finally, the prior art reference (or references*

when combined) must teach or suggest all the claim limitations. See MPEP § 706.02(j). *See also KSR Int'l Co. v. Teleflex, Inc.,* 550 U. S. ____, 04-1350, slip op. at 14 (2007). The reasonable expectation of success must be found in the prior art and not based on applicant's disclosure. *See In re Vaeck,* 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991) (emphasis added).

The subject matter of the present innovation relates to systems and methods for improved collaborative filtering, providing greater efficiency while utilizing a minimum amount of memory. In particular, independent claim 101 (upon which the other subject claims depend) recites *selecting an appropriate measure of association from among known measures of association, the selection is based on* the known measures of association and *the item set*. The cited references remain silent with respect to this novel aspect of the subject claims.

Linden *et al.* does not teach or suggest the aforementioned novel features as recited in the subject claims. Rather, Linden *et al.* discloses a collaborative filtering system to predict interest in items based on data of past interest in the items. The system uses a fixed, pre-chosen measure of association (commonality index, "CI") to generate recommendations based on correlations between items. The cited reference discloses choosing this measure of association based solely on its features, and discloses a preferred measure of association to be used regardless of the item set. As new item sets are input, the cited reference uses the same measure of association to produce scores of the new item sets. However, Linden is silent regarding the novel features identified above.

Linden fails to disclose choosing the measure of association, much less choosing one based on features of the input item set which is to be scored. Therefore, the cited reference fails to teach or suggest *selecting an appropriate measure of association from among known measures of association, the selection is based on . . . the item set*, as recited in independent claim 101.

Karypis *et al.* fails to overcome the deficiencies of Linden *et al.* Karypis *et al.* analyzes multiple algorithms used in recommender systems for recommending products in E-commerce. These algorithms are analyzed against two different data sets. Recommender systems are discussed in three aspects: how to represent the data set (whether to use a lower dimensional representation); which neighboring customers to consider as a basis for recommending products (whether to only include certain customers for the basis of recommendation generation, and if so,

which customers); and the algorithm used to generate recommendations based on the purchases of neighboring customers (whether to base recommendations upon a measure of association determined from associational rules, or choose the *n* most frequent items). However, Karypis *et al.* fails to teach or suggest *selecting an appropriate measure of association from among known measures of association, the selection is based on the known measures of association and the item set.*

Karypis *et al.* fails to teach or suggest the features identified above. At page 165, Karypis *et al.* indicates that they "believe [the most frequent item approach] should be preferred over the neighborhood association rule" for both of the data sets they considered. Karypis *et al.* refers to the most frequent item approach as standing in opposition to analysis based on association rules, thus arguably does not even recommend any measure of association, much less selecting an appropriate one based on the item set. Even if 'the most frequent item approach' recommended by Karypis *et al.* is considered a measure of association (despite language in Karypis *et al.* to the contrary; *see, e.g.*, pp. 162 and 165), the cited reference still makes no mention of the novel features identified above, instead recommending this same approach for all data sets.

The proximity between customers (measurable in Karypis *et al. via* either the correlation or cosine methods; *see* Section 3.2.2, "Neighborhood Formation: Proximity Measure," at p.162) is cited by the Examiner in connection with selecting a measure of association. However, as indicated in Karypis *et al.* and above, these two methods are used not as a measure of association, but to determine which customers form the neighborhood among which the measure of association (or most frequent item method) will be applied (in Section 3.2.3, "Generation of Recommendation," at p.162). The results of the correlation and cosine methods are not to score the products or determine recommendations (as would be the case with a measure of association), but rather to remove data from being considered for scoring or recommendation. Thus, these methods are in fact not measures of association. It is in a later step of Karypis *et al.* (generation of recommendation) that products are scored or frequency determined such that a recommendation can be made, as with a measure of association. *See* Section 3.2.3, "Generation of Recommendation," at p.162 And, as made clear above, Karypis *et al.* recommends that in this step 'the most frequent item approach' should be universally applied. Karypis *et al.* neither teaches nor suggests the novel features of the subject claims identified earlier.

Moreover, both references teach away from *selecting an appropriate measure of association from among known measures of association, the selection is based on . . . the item set.* The Federal Circuit has held that teaching away is a *per se* demonstration of lack of *prima facie* obviousness. *In re Dow Chemical Co.*, 837 F.2d 469, 5 USPQ2d 1529 (Fed. Cir. 1988).

> A prior art reference must be considered in its entirety, i.e., as a *whole*, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984).

As discussed *supra*, Linden *et al.* indicates a preferred measure of association that is to be used in all circumstances (*see, e.g.*, col.12, l.66-col.13, l.24; the referenced table is erroneously a duplicate of the one above, but the formula of the preferred CI is derivable *via* the accompanying examples). Karypis *et al.*, meanwhile, claims that 'the most frequent item approach' is superior to all measures of association (or, if considered as a measure of association despite contrary language in Karypis *et al.*, that it is superior to other measures of association). *See, e.g.*, p. 165. Both references teach a single measure regarded as superior to all other measures (or possibly, in Karypis *et al.*, a technique considered superior to all measures of association), and does not teach both (1) that there is a universally superior measure of association (or alternative to a measure), and (2) that superior measure (or alternative) is the one identified in the reference.

The teaching of Linden *et al.* that the CI disclosed therein is superior would have to be ignored in order to assume, as the Examiner suggests at page 4 of the Office Action, that "it would have been obvious to one of ordinary skill in the art at the time of invention to *first choose* an appropriate measure [other than the CI of Linden *et al.*] to serve as the fixed measure of association prior to performing the collaborative filtering method of Linden." Even assuming this contention to be true, it still falls short of the key features of the subject claims. If an appropriate measure of association is chosen as a fixed measure prior to performing the method, that selection (because it was fixed prior to performing the method) would not be based on the item set, as is recited in the subject claims. Moreover, selecting a measure of association based on the item set, far from being suggested by either reference, is explicitly taught against by both references. Linden *et al.* identifies the preferred CI (at col.12, l.66-col.13, l.24) based entirely on the features of that CI and independent of the item set, and Karypis *et al.* notes at page 165 that

'the most frequent item approach' (if it is even a measure of association, *see* above) should be preferred for all data sets, based on its features. Because both references teach away from the above-identified novel features in the two ways identified above, these references fail to render the subject claims obvious.

Claim 156 recites *selecting at least one additional measure of association based on the item set; and scoring at least one item of the item set by employing the at least one additional measure of association.* As made clear above, neither of the cited references teach or suggest selecting a measure of association based on the item set; rather, both teach away from the subject claims. These arguments apply *a fortiori* to *selecting at least one **additional** measure of association based on the item set.* In addition, Karypis *et al.*, which places a heavy emphasis on computational efficiency, further teaches away from applying a second measure of association. Given that they "believe [the most frequent item approach] should be preferred over the neighborhood association rule" because of "the simplicity and speed of [the] most frequent item approach," Karypis *et al.* leads away from employing an additional measure of association for scoring at least one item. Thus, the cited references do not render claim 156 obvious.

Based on at least the foregoing, it is readily apparent that Linden *et al.*, either alone or in combination with Karypis, *et al.*, does not teach or suggest the subject innovation as recited in independent claim 101 (and claims 153, 155, and 156 which depend thereupon), and therefore fails to make obvious the subject claims. Accordingly, applicants' representative respectfully submits that this rejection should be withdrawn.

III.   Rejection of Claims 152 and 154 Under 35 U.S.C. §103(a)

Claims 152 and 154 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Linden *et al.* (US 6,216,649) in view of Karypis *et al.* ("Evaluation of Item-based Top-N Recommendation Algorithms" 2001) as applied to claims 101 and 153, respectively, and further in view of Bradley *et al.* (US 7,194,477). Applicants' representative respectfully submits that this rejection should be withdrawn for at least the following reasons. Claim 101, upon which the subject claims depend, is believed to be allowable over the combination of Linden *et al.* and Karypis *et al.*, as explained in detail above. Bradley *et al.* does not overcome the deficiencies of the other references. Accordingly, this rejection should be withdrawn.

IV.   Rejection of Claims 1, 3, 150, 151, and 157 Under 35 U.S.C. §103(a)

Claims 1, 3, 150, 151, and 157 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Linden *et al.* (US 6,216,649) in view of Karypis *et al.* ("Evaluation of Item-based Top-N Recommendation Algorithms" 2001) and further in view of Pyo (US 6,636,836). This rejection should be withdrawn for at least the following reasons. Linden *et al.*, either alone or in combination with Karypis *et al.* and Pyo, neither teaches nor suggests each and every limitation of the subject claims.

Linden *et al.* and Karypis *et al.* were discussed earlier in connection with claim 101, where it was explained that instead of teaching or suggesting *selecting an appropriate measure of association from among known measures of association, the selection is based on . . . the item set*, those references instead taught away from those features. Independent claim 157 recites *means for selecting, based on the item set, an appropriate measure of association from among known measures of association [and] selecting at least one additional measure of association based on the item set.* Independent claim 1 recites *a measure of association selection component that **selects an appropriate measure of association from among known measures of association, the selection is based on . . . an item set** . . . .* Because Linden *et al.* and Karypis *et al.* are silent regarding (and teach away from) *selecting an appropriate measure of association from among known measures of association, the selection is based on . . . the item set*, they are also silent regarding (and teach away from) the above identified novel features.

Pyo fails to make up for the shortcomings of the other references. Pyo discloses a system utilizing multiple recommendation agents. A user agent stores information for each user, including weights assigned to each recommendation agent for each user based on the stored user information. Individual recommendations are received from each recommendation agent and combined to present a list of recommendations to a user. The weights assigned to recommendation agents are determined based on user satisfaction with previous recommendation from that agent. However, Pyo neither teaches nor suggests the novel features identified above.

Pyo makes no mention of a component that *selects an appropriate measure of association . . . based on . . . an item set*, or means for selecting such a measure. In Pyo, varying weights are applied to the various recommendation agents based on user feedback. Although measures of association are briefly mentioned in Pyo (*see* col.8 l.40-44, discussing different bases for the generated recommendations), nowhere is it indicated that the selection of a measure

of association or of a recommendation agent employing such would be based on the item set. Instead, weighting between recommendation agents is based on each user's feedback in order to allow personalization. Pyo remains silent, however, regarding the key elements of the subject claims identified above.

Claim 151 recites that *the measure of association selection component selects at least one additional measure of association based on the item set, and the filtering component scores at least one item of the item set by employing the at least one additional measure of association.* As elucidated above, none of the references teach or suggest a component that selects a measure of association based on the item set, and Linden *et al.* and Karypis *et al.* teach away from such a feature. Thus the references could not teach or suggest (and Linden *et al.* and Karypis *et al.* teach away from) a component that selects a second measure of association based on the item set. Moreover, as explained above in connection with claim 156, Karypis *et al.* further teaches away from utilizing a second measure to score an item or items, as recited in the subject claim.

Based on at least the foregoing, it is clear that Linden *et al.*, either alone or in combination with Karypis, *et al.* and Pyo, does not teach or suggest the subject innovation as recited in independent claims 1 and 157 (and claims 3, 150, and 151 which depend thereupon), and therefore fails to make obvious the subject claims. Accordingly, applicants' representative respectfully submits that this rejection should be withdrawn.

V.   Rejection of Claims 2 and 4 Under 35 U.S.C. §103(a)

Claims 2 and 4 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Linden *et al.* (US 6,216,649) in view of Karypis *et al.* ("Evaluation of Item-based Top-N Recommendation Algorithms" 2001) and Pyo (US 6,636,836) as applied to claims 1 and 3, respectively, and further in view of Bradley *et al.* (US 7,194,477). This rejection should be withdrawn for at least the following reasons. Independent claim 1 (upon which the subject claims depend) is believed to be allowable over Linden *et al.*, Karypis *et al.*, and Pyo, separately or in combination. Bradley *et al.* does not make up for these shortcomings. Accordingly, applicants' representative respectfully submits that this rejection should be withdrawn.

CONCLUSION

The present application is believed to be in condition for allowance in view of the above comments and amendments. A prompt action to such end is earnestly solicited.

In the event any fees are due in connection with this document, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063 [MSFTP433US].

Should the Examiner believe a telephone interview would be helpful to expedite favorable prosecution, the Examiner is invited to contact applicants' undersigned representative at the telephone number below.

Respectfully submitted,

AMIN, TUROCY & CALVIN, LLP

/Himanshu S. Amin/
Himanshu S. Amin
Reg. No. 40,894

AMIN, TUROCY & CALVIN, LLP
57TH Floor, Key Tower
127 Public Square
Cleveland, Ohio 44114
Telephone (216) 696-8730
Facsimile (216) 696-8731